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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/606,992	06/25/2003	Dan Daeweon Cheong	356828001US1	4507

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EXAMINER	
LIN, JAMES	

ART UNIT	PAPER NUMBER
1792	

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Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary	Application No.	Applicant(s)	
	10/606,992	CHEONG, DAN DAEWEON	
	Examiner	Art Unit	
	Jimmy Lin	1792	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *22 August 2007*.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *24-26,28-36,38-44 and 46* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *24-26,28-36,38-44 and 46* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO/SB/08) Paper No(s)/Mail Date _____.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____.
5) ☐ Notice of Informal Patent Application
6) ☐ Other: _____.

DETAILED ACTION

Continued Examination Under 37 CFR 1.114

1. A request for continued examination under 37 CFR 1.114, including the fee set forth in 37 CFR 1.17(e), was filed in this application after final rejection. Since this application is eligible for continued examination under 37 CFR 1.114, and the fee set forth in 37 CFR 1.17(e) has been timely paid, the finality of the previous Office action has been withdrawn pursuant to 37 CFR 1.114. Applicant's submission filed on 8/22/2007 has been entered.

Claim Rejections - 35 USC § 112

2. The following is a quotation of the first paragraph of 35 U.S.C. 112:

> The specification shall contain a written description of the invention, and of the manner and process of making and using it, in such full, clear, concise, and exact terms as to enable any person skilled in the art to which it pertains, or with which it is most nearly connected, to make and use the same and shall set forth the best mode contemplated by the inventor of carrying out his invention.

3. Claims 26, 38-40, and 43-44 are rejected under 35 U.S.C. 112, first paragraph, as failing to comply with the written description requirement. The claim(s) contains subject matter which was not described in the specification in such a way as to reasonably convey to one skilled in the relevant art that the inventor(s), at the time the application was filed, had possession of the claimed invention.

There is no support for "wherein controlling stoichiometry of said vaporized components includes controlling temperatures of the first and second sources" (claim 26). The specification seems that the control of stoichiometry during deposition is effected using two or more deposition sources with different chemical compositions (pg. 7, lines 10-16), but never mentions anything about controlling the temperature.

There is no support for the composition to be a dielectric film being selected from the group of thioaluminates, thiogallates, and thioindates (claim 38). The specification teaches that such compounds are preferred phosphors. The specification seems to suggest that the claimed method can either deposit phosphors or dielectric films, but does not seem to teach that a phosphor can be a dielectric film.

4. The following is a quotation of the second paragraph of 35 U.S.C. 112:

> The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

5. Claims 41-42 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

Claim 41 requires vapor deposition by thermal evaporation while parent claim 24 requires vapor deposition by sputtering. The two methods are not usable in the same embodiment because they are two very different processes of vapor deposition and because a thermal evaporation method cannot cause sputtering of a source.

Claim Rejections - 35 USC § 103

6. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

7. Claims 24, 26, 33, 37, 41-42, and 46 are rejected under 35 U.S.C. 103(a) as being unpatentable over McKee et al. (U.S. Patent 5,906,857) in view of Forbes et al. (U.S. Patent 6,255,156).

McKee teaches a method of depositing a thin film of a pre-determined composition onto a substrate, said composition comprising a ternary composition (col. 9, lines 22 – 41), the method comprising:

placing a first and second deposit at a first and second source of vaporization in a vapor deposition apparatus;

simultaneously sputtering the components from the first and second deposits onto the first and second coating rate monitors, respectively, and also onto the substrate (col. 4, lines 31-43; col. 9, lines 22 – 57; Fig. 11);

placing first and second coating rate monitors 84 adjacent to the substrate, the first coating rate monitor shielded from the second source but open to the first source, and the second coating rate monitor shielded from the first source but open to the second source;

independently measuring rates of deposition of the components onto the first and second coating rate monitors (Figs. 1, 3, and 10, Col. 10, lines 42 – 53);

determining temporal variation of the deposition of the components based on independently measured rates of deposition (Col. 2, lines 15 – 30);

McKee teaches that the vapor of the sources is pulsed or intermittently fluxed (Figs. 7-8). During each pulse, there is a constant deposition of the source.

McKee does not teach controlling the stoichiometry of the vaporized components using the feedback control. However, McKee teaches that the temperature of the source can be adjusted based on the measured variances of the deposition rate to achieve a uniform film (Col. 10, lines 59 – 65, Col. 4, lines 11 – 30), thereby providing a feedback control of monitoring the deposition. Forbes teaches that it is well known in the art of vapor deposition that the rate of vaporization of the sources can be adjusted to achieve the desired stoichiometry (Col. 5, line 62 – Col. 6, line 3). The method of McKee would have necessarily controlled the rate of vaporization because McKee teaches that the temperature source is adjusted, as discussed above. The temperature of the source directly affects the rate of vaporization. Therefore, it would have been obvious to one of ordinary skill in the art at the time of invention to have adjusted the rate of vaporization of the sources to control the stoichiometry. One would have been motivated to do so in order to deposit a film with the desired composition ratio.

Claim 26: McKee teaches that the temperature of the sources can be adjusted to control the rate of deposition, and Forbes teaches that the stoichiometry can be controlled by the rate of vaporization.

Claim 33: McKee teaches that a third deposit is placed at a third source, wherein the components of the third deposit form part of the composition (Figs. 1 and 10, Col. 9, lines 22 – 41).

Claims 37, 41: McKee teaches that the vapor deposition can be carried out by sputtering and thermal evaporation (Col. 1, lines 12 – 19).

Claim 42: The temperature of the sources can be controlled, as discussed above.

Claim 46: McKee teaches that homogenous layers of AC and BC are formed (Fig. 11). The y-axis of the graph refers to deposition sources A, B, and C. The graph as a whole indicates when and for how long the shutter for each source is open. The open shutter state of C always overlaps with the open shutter state of either A or B, thus forming homogenous layers.

8. Claim 25 is rejected under 35 U.S.C. 103(a) as being unpatentable over McKee '857 in view of Forbes '156 as applied to claim 24 above, and further in view of Chow et al. (U.S. Patent 5,882,773).

McKee teaches a rate monitor that measures the rate of deposition, wherein the temperature of the source can be adjusted accordingly, but does not teach using a crystal rate monitor. However, Chow teaches that a crystal rate monitor can measure the deposition rate in the method of vapor deposition and that the temperature of the source can be adjusted depending on the deposition rate (Col. 5, lines 1 – 11). The selection of something based on its known suitability for its intended use has been held to support a prima facie case of obviousness. Sinclair & Carroll Co. v. Interchemical Corp., 325 U.S. 327, 65 USPQ 297 (1945). Therefore, it would have been obvious to one of ordinary skill in the art at the time of invention to have used a crystal rate monitor as the particular rate monitor of McKee because Chow teaches that such as rate monitor can be used to measure the rate of deposition.

9. Claims 24-26, 28-29, 32-36, and 46 are rejected under 35 U.S.C. 103(a) as being unpatentable over Velthaus et al. (U.S. Patent 5,505,986) in view of Shimoyama et al. (U.S. Patent No. 5,372,837) and Satoh et al. (U.S. Patent No. 5,585,167).

Velthaus et al. teaches a method for the deposition of an electroluminescent (EL) thin film onto a substrate, wherein the film comprises a ternary, quaternary, or higher composition. Multiple compositions are simultaneously coevaporated via sputtering to form the EL film. (Abstract, Figure 2, col. 2, line 39 – col. 4, line 33).

Velthaus does not explicitly teach the steps of independently monitoring the rate of deposition using coating rate monitors and determining the temporal variation of the deposition based on the independently measured rates of deposition. However, Velthaus does teach the need to control the flux of each source individually via independently adjusting the temperature

of each source in order to ensure a desired stoichiometry of the deposited film (col. 2, lines 17-21; col. 3, lines 1-10), thereby indicating a desire for continuous homogenous temporal deposition of the film. Shimoyama teaches determining the temporal variation of each of a plurality of phosphor deposits by using crystal rate monitors to measure the respective deposition rates and independently controlling the flux of each composition to form a uniform phosphor film on an EL substrate (Fig. 5; col. 1, line 39-col. 2, line 27). Therefore, it would have been obvious to one of ordinary skill in the art at the time of invention to have used a coating rate monitor in the sputtering process of Velthaus with a reasonable expectation of success because Velthaus teaches the need form a film having a desired stoichiometry by individually controlling the flux and temperature of each deposition source and because Shimoyama teaches that the use of a crystal rate monitor is operable for such controls. The selection of something based on its known suitability for its intended use has been held to support a prima facie case of obviousness. Sinclair & Carroll Co. v. Interchemical Corp., 325 U.S. 327, 65 USPQ 297 (1945).

Velthaus and Shimoyama do not explicitly teach that the first coating rate monitor is shielded from deposition from the second source but open to deposition from the first source, and vice versa with the second coating rate monitor. However, it is clear from Shimoyama that each coating rate monitor should only measure the flux of material emitted from its corresponding coating material source. Satoh teaches that it was well known in the art of vapor deposition to provide a partition wall 34 in the method of effecting vaporization of multiple sources in a single deposition chamber, wherein each source is provided with a quartz crystal rate monitor 21,22,23. The partition wall has openings such that the first source can deposit onto the first coating rate monitor while shielding the rate monitor from deposition of the other sources in order to individually measure the rate of deposition of the first source (col. 6, lines 13-49; Fig. 2). It would have been obvious to one of ordinary skill in the art at the time of invention to have provided a partition wall having openings for the respective sources and crystal rate monitors in the deposition chamber of Velthaus and Shimoyama with a reasonable expectation of success because Shimoyama teaches the desire to individually measure the rate of deposition of a single source via a respective coating rate monitor and because Satoh teaches that providing a partition wall is an operable method of ensuring such an individual measurement.

As to controlling the stoichiometry of the sputtered components using the temporal variation of the deposition of the components as feedback to provide a constant deposition on the substrate and the coating rate monitors, one of ordinary skill in the art would have reasonably done so based on 1) Velthaus's teaching that controlling the flux of each component can control the stoichiometry of the film and that there is a need to form a film having a desired stoichiometry and 2) Shimoyama's teaching that a coating rate monitor can independently measure the flux of a source.

Claim 25: Shimoyama teaches that the coating rate monitors can be crystal rate monitors (col. 1, lines 62-66).

Claim 26: Velthaus teaches that controlling the stoichiometry of the film includes controlling the temperatures of the sources (col. 2, lines 17-21; col. 3, lines 1-10).

Claims 28-29,35-36: Velthaus teaches that the deposited film is a thin phosphor film of the stoichiometry $M^{II}M^{III}_2X_4$:RE (col. 2, lines 61-67).

Claim 32: Velthaus teaches that the deposition sources can be sulphides (col. 3, lines 21-55).

Claim 33: Velthaus teaches that a third source can be used to form part of the film (Fig. 2; col. 3, lines 21-26).

Claim 34: Velthaus teaches that the substrate can be ZnO:Al (Fig. 1, col. 2, lines 39 – 41).

10. Claims 30 – 31 and 38 are rejected under 35 U.S.C. 103(a) as being unpatentable over Velthaus '986 in view of Shimoyama '837 and Satoh '167 as applied to claim 24 above, and further in view of Fuyama et al. (U.S. Patent 4,857,802).

Velthaus, McKee, and Forbes are discussed above, but do not explicitly teach the deposition of a dielectric layer such that a phosphor is deposited juxtaposed to the dielectric layer. However, Velthaus teaches a Si_3N_4 dielectric layer below the phosphor layer (Fig. 1, Col. 2, lines 39 – 60) but is silent as to how the dielectric layer is deposited. Fuyama teaches a method of depositing a dielectric layer for an EL device, wherein the dielectric layer is a multi-component composition such as $SrTiO_3$, $PbTiO_3$, and $BaTiO_3$ is sputtered onto the substrate (abstract). Fuyama teaches that dielectric films such as Si_3N_4 has a low dielectric constant,

thereby requiring a very high driving voltage for emitting the light-emitting layer. The preferred dielectric layers would lower the driving voltage in the EL device (Col. 1, line 56 – Col. 2, line 2). Therefore, it would have been obvious to one of ordinary skill in the art at the time of invention to have used the dielectric layers of Fuyama in the device of Velthaus while utilizing the monitoring/controlling method of McKee because Fuyama teaches that the preferred dielectric films will allow for a lower driving voltage, thereby extending the life of the EL device.

11. Claims 39-40 and 43-44 are rejected under 35 U.S.C. 103(a) as being unpatentable over Velthaus '986 in view of Shimoyama '837, Satoh '167, and Fuyama '802 as applied to claim 38 above, and further in view of Luhman et al. (U.S. Patent No. 5,987,340).

Velthaus, Shimoyama, and Luhman are discussed above. Velthaus teaches that EL film can be formed via sputtering of the sources, but does not explicitly teach that an electron beam can be used to cause the sputtering. However, Luhman teaches that it was well known in the art to use an electron beam as the energy source to effect sputter deposition (col. 3, lines 34-37). Therefore, it would have been obvious to one of ordinary skill in the art at the time of invention to have used an electron beam as the particular energy source in the sputtering method of Velthaus with a reasonable expectation of success because Luhman teaches that such a method is operable for sputtering.

Response to Arguments

12. Applicant's arguments filed 1/31/2007 have been fully considered but they are not persuasive.

Claim 26 as rejected under 35 U.S.C. 112, first paragraph:

Applicant traverses the rejection and argues on pg. 7 that support for the claim can be found in the specification at pg. 4, lines 32-34. However, the specified lines do not mention anything about stoichiometry, as required in the claim.

Claims 24, 26, 33, 37, 41, 42, and 46 as rejected over KcKee '857 and Forbes '156:

Applicant argues on pg. 9 that McKee discloses metering out pulses of evaporant from the sources to sequentially deposit layers of different composition onto a substrate and that McKee's deposition process is an intermittent deposition process and not a constant deposition process. However, the evaporants of McKee is pulsed when the shutters are open. During the period of time that the shutters are open, there is constant deposition.

Claims 24, 28-30, and 32-44 as rejected over Velthaus, McKee, and Forbes:

Applicant argues on pgs. 10-11 that Velthaus discloses controlling individual fluxes of evaporated materials to be deposited onto a substrate in a feed-forward fashion while McKee discloses a feedback control scheme using the measured evaporation rate to adjust the temperature of each source, and thus modifying Velthaus's deposition system to include McKee's deposition rate monitors would transform Velthaus's process to a feedback operation. However, there is no indication that using a feedback process in the deposition method of Velthaus would render the method inoperable. One of ordinary skill in the art would have recognized that the method of McKee can be used in the method of Velthaus for the reasons previously stated. Nevertheless, the rejection has been modified to account for the claim amendments.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Jimmy Lin whose telephone number is 571-272-8902. The examiner can normally be reached on Monday thru Friday 8AM - 5:30PM.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Tim Meeks can be reached on 571-272-1423. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

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TIMOTHY MEEKS
SUPERVISORY PATENT EXAMINER